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An Insight into Thyroid Lesions By Fine Needle Aspiration Cytology/ Fine Needle Biopsy – A Retrospective Study.

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I. Introduction

Fine Needle Aspiration Cytology plays an essential role in the evaluation of a euthyroid patient with a thyroid nodule. Several guidelines highlight the significance of thyroid cytology. [1] Thyroid cytology can provide a definite diagnosis of malignancy, with the type of tumour, which enables appropriate therapeutic surgery in one stage. It also triages patients thus helping differentiate those who require surgical intervention from those who can be managed with medical/ endocrinological management. According to literature incidence of thyroid malignancy is relatively low, that is only 1 in 20 clinically identified nodules turn out to be malignant [2], and therefore thyroid fine needle aspiration helps reduce the rate of surgery for benign thyroid disease. Aspiration cytology of the thyroid is found to be a valuable adjunct to pre-operative screening in the diagnosis of thyroid lesions.[3] Aspiration under ultrasound guidance is now widely used, particularly for nodules deep in the neck and when aspiration fails to yield adequate cellular material and it contributes to diagnostic accuracy.[4]

II. Materials And Methods

A retrospective study of thyroid FNACs conducted during a time span of 18 months i.e. September 2012 to February 2014 was carried out at the Department of Pathology, Mysore Medical College and Research Institute, Mysore, Karnataka. We included a total of 1177 cases.

The aspiration was performed under aseptic conditions using a 23 gauge needle. Smears were fixed in Carnoy's solution and stained with haematoxylin and eosin or Papanicolaou stain. Wherever fluid was obtained, smears were made from centrifuged sediment.

FNAC results were classified into:

1) Benign (goitre, adenomatoid nodule, benign cystic lesion, thyroiditis, thyroglossal cyst)
2) Suspicious (follicular neoplasm, suspicious of papillary carcinoma, suspicious of medullary carcinoma)
3) Malignant (papillary carcinoma, medullary carcinoma, anaplastic carcinoma)

A histopathological correlation was done wherever possible.

III. Results

The mean age of presentation was 34.7 years.

Maximum patients 31% (367/1177) fell in the age group 21-30 years, closely followed by 29.3% patients (346/1177) in the age group 31-40 years. The youngest patient was 5 years old while the eldest was 80 years old.

Table: 1 Age-wise distribution of cases

AGE GROUP	NO. OF CASES	PERCENTAGE
1-10	16	1.36%
11-20	133	11.3%
21-30	367	31.2%
31-40	346	29.4%
41-50	179	15.2%
51-60	96	8.15%
61-70	33	2.8%
71-80	7	0.6%

Out of 1177 patients, 1091 (92.7%) were female and 86 (7.3%) were male, giving a male to female ratio of 1 :12.7. Out of total 1177 cases, 1116 (94.8%) were benign, 41 (3.4%) were suspicious, while 20 (1.7%) were malignant.

Table: 2 Percent distribution of various cytological diagnosis

S.NO	CYTOLOGICAL DIAGNOSIS	NUMBER	PERCENTAGE
	BENIGN:		
1	Colloid/ Nodular Goitre	593	50.4%
2	Adenomatoid Nodule	45	3.8%
3	Benign Cystic Lesion	13	1.1%
4	Thyroiditis		

	- Acute thyroiditis - Lymphocytic thyroiditis - Hashimoto Thyroiditis - De-Quervians Thyroiditis	2 106 348 1	0.17% 9% 29.5% 0.08%
5	Thyroglossal cyst	8	0.68%
	SUSPICIOUS:		
6	Follicular Neoplasms	35	3%
7	Suspicious of Papillary carcinoma	5	0.42%
8	Suspicious of medullary carcinoma	1	0.08%
	MALIGNANT		
9	Papillary carcinoma	14	1.19%
10	Medullary carcinoma	3	0.25%
11	Anaplastic carcinoma	3	0.25%

Histopathological correlation could be done in 45 cases.

Table :3 Cytological and Histopathological diagnosis correlation

CYTOLOGICAL DIAGNOSIS										
	NO OF CASES	**FOLLICULAR ADENOMA**	**FOLLICULAR CARCINOMA**	**FVPTC**	**COLLOID GOITRE**	**PAPILLARY CA**	**MEDULLARY CA**	**ADENOMATOID GOITRE**	**ADENO GOITRE WITH FOCI OF FVPTC**	**ACCURACY**
FOLLICULAR NEOPLASMS	24	19	1	2	2					79.1%
PAPILLARY CA	15				2	13				86.6%
MEDULLARY CA	4						4			100%
ADENOMATOID GOITRE	2							1	1	50%

Overall accuracy of FNA was found to be 82.2%, sensitivity of 92.5%.
False positive rate was 6.6%. The true frequency of false negative results cannot be calculated as only a small fraction of patients with benign diagnosis on cytology undergo surgery.

IV. Discussion

The age of presentation of various thyroid lesions ranged from 5 years to 80 years with maximum patients falling in the age group of 21- 40 years. The youngest was a child aged 5 years diagnosed as goitre and oldest 80 year old female diagnosed as having anaplastic carcinoma. The mean age at presentation was 34.7 years. Dorairagan N et al [(5)](1996) in his study reported that maximum patients with thyroid lesions fell in the age group of 30-50 years and only a few were below 20 years of age. Our study is in concordance with this study.

Thyroid lesions are more prevalent in females than males. In our study 92.7% of cases were females and 7.3% males. Male to female ratio was 1:12.7. Similar findings were reported by Dorairajan N et al [(5)] (1996) with Male to Female ratio being 1:9.

Cytological smears in thyroid lesions were divided into benign, malignant and suspicious/indeterminate as per criteria given in observations. Benign lesions were more common constituting 94.8% whereas malignant were seen to the extent 1.7% in this study. Smears were suspicious/ indeterminate in 3.5 %.

Suspicious/indeterminate lesions included follicular neoplasms, & smears suggestive of but not diagnostic of malignancy. Gharib et al [(7)] (1991) examined 10917 cytological smears of thyroid lesions and observed that 89% were of benign lesions, 4% malignant, 7% suspicious. Our findings were in concordance with this study. Different studies have shown variable results which are probably due to studies being conducted on variable population groups and influences of geographical, environment, dietary and hereditary factors.

Follicular neoplasms are very difficult to categorise into benign or malignant, because cytological smears shows similar morphology. Only a histological biopsy can confirm the true nature of a follicular neoplasm.

False negative and false positive results are a cause of concern as they put the reliability of cytology into question. However, the true frequency of false negative results is difficult to calculate as very few patients with benign cytological findings undergo surgery. The incidence of false negative in diagnosis of thyroid aspirates may be high and is usually attributable to overlooking of malignancy in favour of follicular adenoma, cystic lesions and hashimoto thyroiditis.

False positive rate in our study was 6.6%. This finding is consistent with the other reports that cited rate ranging from 0 – 9% [9].False positive diagnosis is the result of misinterpretation of the nature of benign cell than a sampling error. False positive diagnosis are usually encountered in hashimotos thyroiditis, parathyroid/atypical adenoma, adenomatoid change or hyperplastic changes

The categorization of cytological results into benign, suspicious and malignant is necessary to allow clinicians to use cytology results to guide the patient management with specific reference to surgery. Follicular neoplasms form a gray zone with differential diagnosis including follicular carcinoma, follicular variant of papillary carcinoma, follicular adenoma and adenomatoid nodule. Follicular adenoma and follicular carcinoma requires detailed histopathological examination for vascular and capsular invasion.

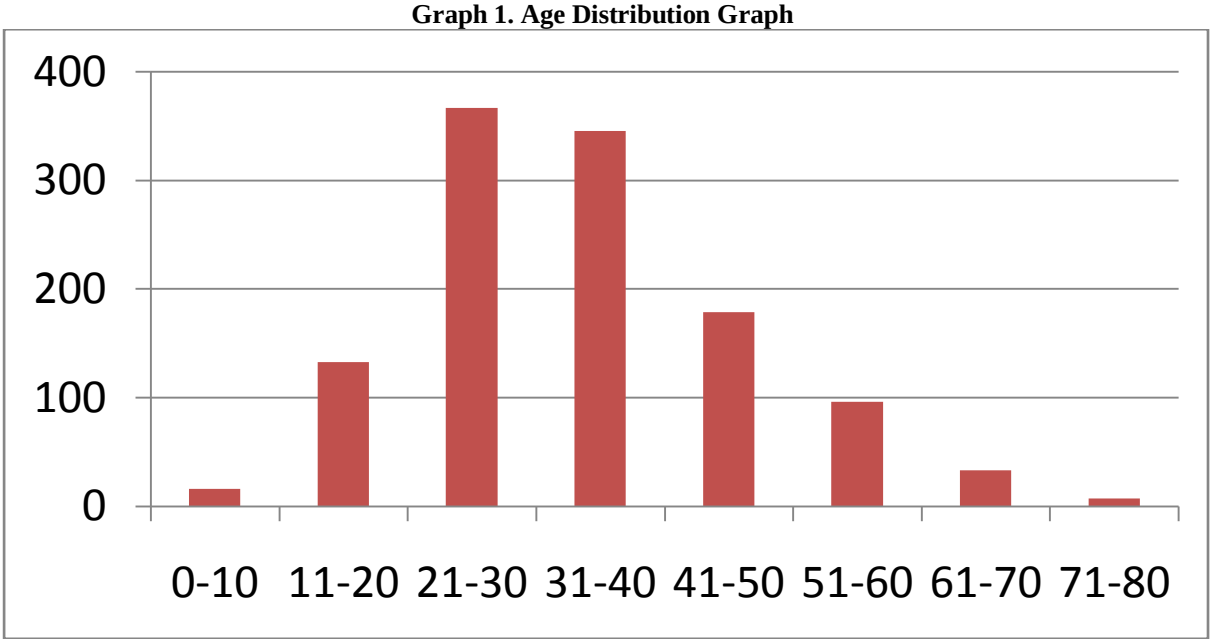
Many papers on the diagnostic sensitivities for thyroid nodules exist in the literature, showing a wide range from 43 – 100% and specificity from 47 – 100% [6, 7, 10, 11, 12]. Factors contributing to this broad range of sensitivity and specificity are the handling of suspicious cases , adequacy of sample , sampling techniques , experience of pathologist in interpretation , length of follow up and inclusion of suspicious/indeterminate cases in the category of false negative diagnosis. In our study the sensitivity was found to be 92.5% and positive predictive value of 82.2%.

The use of Ultrasonographic guidance may be helpful in increasing the efficacy of Fnac's and is recommended in lesion which are nonpalpable or difficult to palpate, predominantly cystic , nondiagnostic after palpation-guided FNA or the ones which are small and located in close proximity to blood vessels.

V. Conclusion

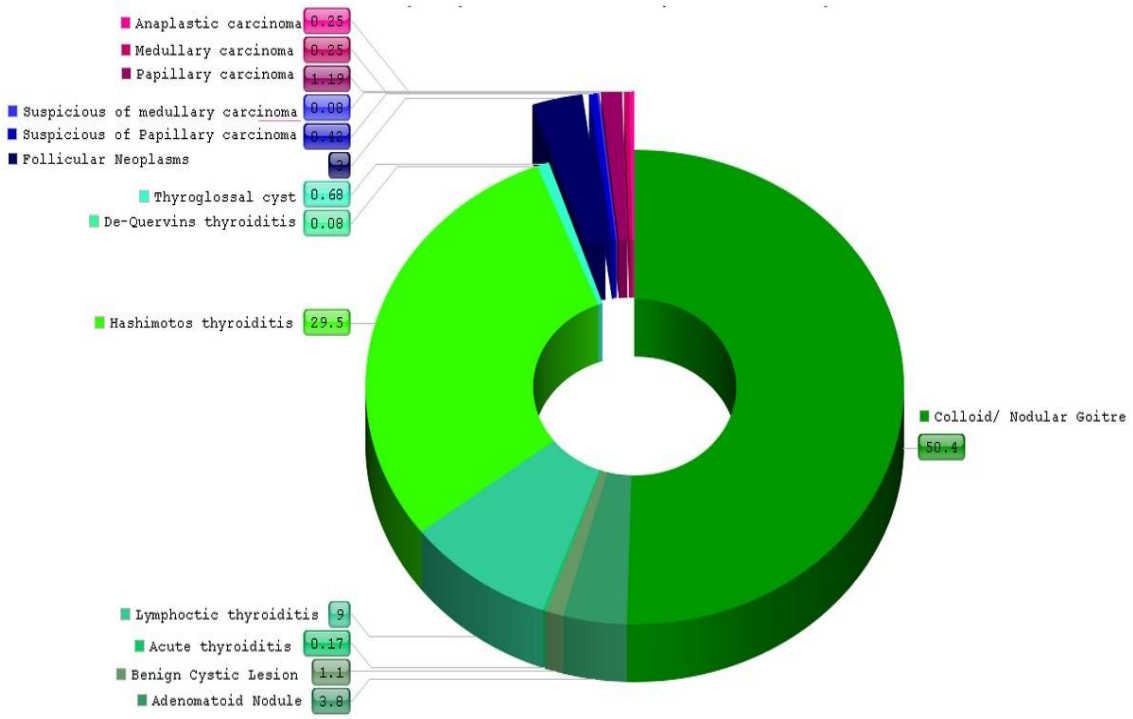
FNAC is considered the gold standard diagnostic test for thyroid lesions with a high diagnostic yield, accuracy, sensitivity and specificity. This technique is easy to perform, cost effective, minimally invasive with few complications. FNA helps reduce the cost of care and avoidance of unnecessary surgery in patients with benign lesions, thereby improving the overall quality of life for patients with thyroid nodules. Because of false-negative results, it is important that patients with benign cytologic findings should have close clinical follow up.

Graph 1. Age Distribution Graph



X axis: Age group in years
Y axis: Number of cases.

Graph 2. Cytological diagnosis



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	MALIGNANT		
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Table 2. Cytological- histopathological correlation (done in 45 cases)

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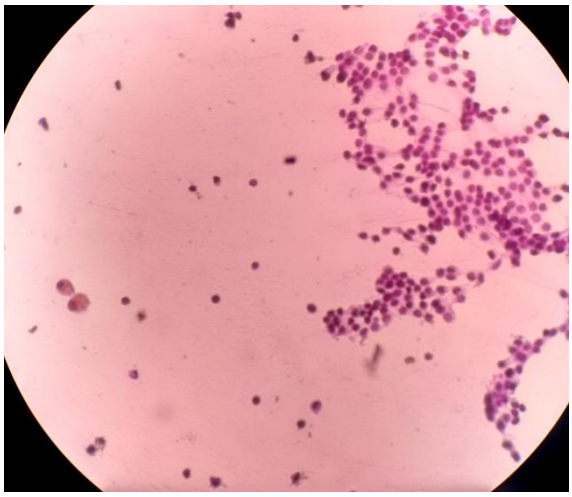

Figure 1. Colloid Goitre Cytology

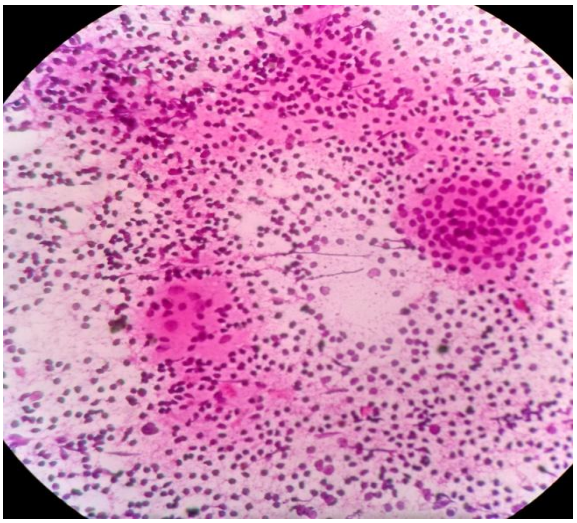

Figure 2. Hashimoto Thyroiditis cytology

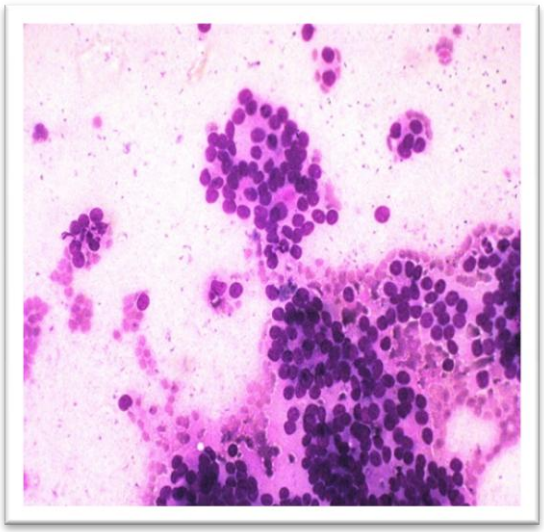

Figure 3. Follicular neoplasm cytology

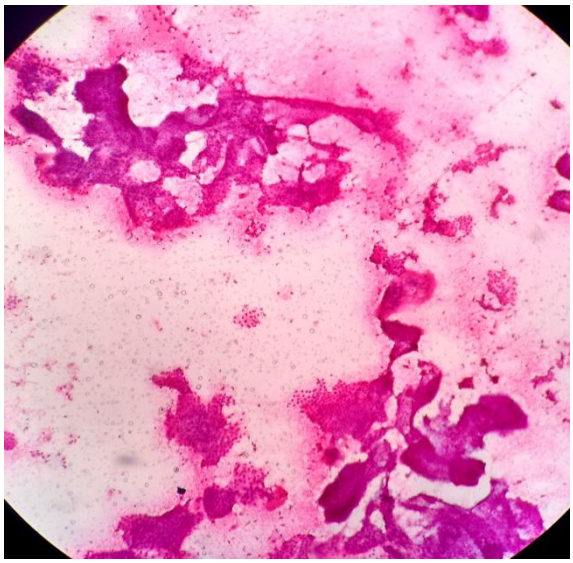

Figure 4. Papillary carcinoma cytology

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